UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Fisheries Science Center
Fish Ecology Division
2725 Montlake Boulevard East
Seattle, Washington 98112-2097

June 29, 2006

MEMORANDUM FOR: F/NWR3 - Leslie Schaeffer

FROM: F/NWC3 - John W. Ferguson

SUBJECT: Application for Endangered Species Act Section 10 Research Permit

Attached is a revised Endangered Species Act Section 10 research permit application for a project composed of two studies: "Estuarine habitat and juvenile salmon - Current and historic linkages in the lower Columbia River and estuary" and "Historic habitat opportunities and food-web linkages of juvenile salmon in the Columbia River estuary and their implications for managing river flows and restoring estuarine habitat". The principal investigator is Dan Bottom, with the National Marine Fisheries Service, Northwest Fisheries Science Center. This permit will replace existing authorization under Permit #1322.

If you have any questions concerning the application, please contact Kinsey Frick at (206) 860-5619.

Attachments

cc: F/NWC3 - Bottom
F/NWC3 - Frick
F/NWC3 - Gores
F/NWC3 - Hinton

A. Title

1. Application of Permit of Scientific Purposes under the Endangered Species Act of 1973.

This application is a combination of two research proposals. The two studies are closely linked in mission, purpose, sampling locations, sampling techniques, personnel, and processing and analyses of all fishes. Requested take represents a cumulative catch for both studies. By combining these efforts, the overall take of fishes will be reduced.

Study 1: "Estuarine habitat and juvenile salmon – Current and historic linkages in the lower Columbia River and estuary." (U.S. Army Corps of Engineers (COE); currently covered by final year of ESA Permit #1322 Mod. 4, January 2001-December 2006)

Study 2: "Historic Habitat Opportunities and Food-Web Linkages of Juvenile Salmon in the Columbia River Estuary and Their Implications for Managing River Flows and Restoring Estuarine Habitat" (Bonneville Power Administration (BPA); expansion of existing study to include fish sampling)

B. Species

Chinook salmon, *Oncorhynchus tshawystcha*, Snake River ESU, fall run
Chinook salmon, *Oncorhynchus tshawystcha*, Snake River ESU, spring/summer run
Chinook salmon, *Oncorhynchus tshawystcha*, Upper Columbia River ESU, spring run
Chinook salmon, *Oncorhynchus tshawystcha*, Lower Columbia River ESU
Chinook salmon, *Oncorhynchus tshawystcha*, Upper Willamette River ESU
Sockeye salmon, *Oncorhynchus nerka*, Snake River ESU
Coho salmon, *Oncorhynchus kisutch*, Lower Columbia River ESU
Chum salmon, *Oncorhynchus keta*, Columbia River ESU
Steelhead, *Oncorhynchus mykiss*, Snake River ESU
Steelhead, *Oncorhynchus mykiss*, Upper Columbia River ESU
Steelhead, *Oncorhynchus mykiss*, Lower Columbia River ESU
Steelhead, *Oncorhynchus mykiss*, Mid-Columbia River ESU
Steelhead, *Oncorhynchus mykiss*, Upper Willamette River ESU

C. Date of Permit Application

29 June 2006
Study duration: 2007-2011 (5 years)

D. Applicant Identity

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E. Information on Personnel, Cooperators, and Sponsors

1. Principal Investigators and Field Supervisors

Dan Bottom, Research Fishery Biologist – Principal Investigator
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Fish Ecology Division
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Susan Hinton, Fishery Biologist – Field Supervisor, Point of Contact
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Charles Simenstad, Research Associate Professor – Co-PI, Field Supervisor
School of Aquatic and Fishery Sciences
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P.O. Box 355020
Seattle, Washington 98195

2. Field Personnel

NOAA Fisheries – Paul Bentley, Michelle Rub, Cindy Bucher, Kym Jacobson, Rick Nelson
Pacific State Marine Fisheries Commission – George McCabe
Oregon State University, Cooperative Institute of Marine Resource Studies – Troy Guy, Mary Bhuthimethee
Washington State University – Lia Stamatiou, Jennifer Burke
Washington Department of Fish and Wildlife – Steve Schroder

3. Funding Sources/Cooperative Institutions

There are two primary sources of funding for the research, Bonneville Power Administration (BPA) and the U.S. Army Corps of Engineers (COE) with secondary funding from the National Marine Fisheries Service, Northwest Fisheries Science Center. Cooperators from the University of Washington and Washington Department of Fish and Wildlife also provide support via use of equipment and personnel.

Internal Northwest Fisheries Science Center Funding
Contact: John W. Ferguson, Division Director
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Bonneville Power Administration
Contact: Jan Brady
Contracting Officer Technical Representative
BPA, mail stop KEWL-4
905 NE 11th Ave
Portland, Oregon 97232.
503-230-4514

Northwest Division, U.S. Army Corps of Engineers,
Portland District
Contact: Blaine D. Ebberts
Contracting Officer Technical Representative
333 S.W. First Avenue
Portland, Oregon 97208-2946
503-808-4763

4. Contractors

The proposed activities will not be conducted by contractors.

5. Disposition of dead specimens

For both studies, intentionally sacrificed fishes and incidental mortalities collected in the field are individually labeled, bagged and placed on ice in coolers, then brought to Point Adams Biological Field Station where they are stored immediately in -80 freezers. In rare instances fishes may be temporarily kept alive while transported from field sites, and sacrificed in the laboratory for immediate processing. For all samples, processing in the laboratory will include the following in any combination:

thawing, weight, length, identification verification, and checks for tags and any other marks; tissue removal for later processing will include the following in any combination: otoliths, scales, kidney, liver, eye, finclip, heart, intestine, spleen, stomach, muscle, gill, bile, blood. Individual samples will be preserved and archived appropriately for each unique process, and distributed to research scientists with the related expertise. Any tags (CWT, PIT) will be removed and preserved. Remaining body tissue is discarded.

Tissues for parasite and disease analysis will be transferred to:

Dr. Kym Jacobson, NMFS – Fish Ecology Division
Hatfield Marine Science Center
2030 SE Marine Science Drive
Newport, Oregon 97365-0389
503-867-0375
kym.jacobson@noaa.gov

Tissues for genetics analysis will be transferred to:

David Teel, NMFS – Conservation Biology Division
Northwest Fisheries Science Center
2725 Montlake Boulevard East
Seattle, Washington 98112-2097
206-842-5434
david.teel@noaa.gov

Tissues for growth and residency (otoliths and scales) will be transferred to:

Lance Campbell, Biologist
Washington Department of Fish and Wildlife
600 Capitol Way N.
Olympia, Washington 98501-1091
lasalmo@comcast.net

Tissues for isotopic and prey resource analysis will be transferred to:

Charles Simenstad, Research Associate Professor, Co-PI, Field Supervisor
Lia Stamatiou, Research Assistant
School of Aquatic and Fishery Sciences, University of Washington
P.O. Box 355020
Seattle, Washington 98195
206-543-7185
simenstd@u.washington.edu

Tissues for toxicology analysis will be transferred to:

Lyndal Johnson, NMFS – Environmental Conservation Division
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2725 Montlake Boulevard East
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All other samples and specimens are expected to be analyzed by listed research scientists within the National Marine Fisheries Service or University of Washington School of Aquatic and Fishery Sciences. Samples may be archived at NOAA's Northwest Fisheries Science Center, Hatfield Marine Science Center, or Point Adams Biological Field Station for later use.

6. Transport and long-term holding of listed species

There are no plans to hold listed species alive long-term. While it is not expected, there could be later potential that few salmon could be transported live to Point Adams Biological Field Station for processing. This is sometimes necessary in order to collect tissues in sterile conditions, and/or when it is only possible to collect samples from recently deceased fishes, for example blood and bile. In those instances fish would be held in a live-well with aerated water, sacrificed on site, and tissues immediately removed. Transportation time would be less than two hours.

F. Project Description, Purpose, and Significance

In addition to the information provided below, the work is described in attached BPA proposal # 200301000 and COE proposal EST–P-02.

1. Goals. The Columbia River estuary is an important migration, rearing, and transition environment for juvenile anadromous salmon. Historical changes in the estuary have reduced salmonid access to critical rearing habitats and may have eliminated sources that fuel the estuary food webs. Lack of information about historical and modern habitat conditions in the estuary undermine existing salmon recovery efforts in the Columbia River basin. The research described in the BPA proposal (Study 2) will lead to reconstruction of historic changes in estuarine rearing opportunities and food web linkages of Columbia River salmon and evaluate their implications for managing river flows and restoring estuarine habitats. To attain these goals it will be necessary to conduct experimental studies in Grays Bay (intertidal and subtidal areas) to assess the effects of wetland restoration projects and compare juvenile salmon habitat use patterns to those in the mainstem of the Columbia River. Columbia River mainstem sampling (margins and tidal channels of islands and mainland shorelines) is addressed in the COE proposal (Study 1). It has been determined there is a lack of information concerning what habitat attributes are needed in the estuarine zone to sustain diverse life history types of

juvenile salmon. Also, there is evidence that reduced flows compared to historic conditions have diminished the availability of wetland habitats that previously supported a diversity of salmon life histories. The goal of the COE proposal is to help define habitat protection and restoration priorities for the Columbia River estuary by determining relationships between estuarine habitat and performance of juvenile salmon, and to examine juvenile salmon potential response to past and future habitat changes. To evaluate the goals of both studies, it is necessary to examine all salmon types that are encountered in the habitats where sampling is to occur. This will involve spring/summer Chinook, fall Chinook, coho and chum salmon, with incidental catches of sockeye salmon and steelhead. Columbia River estuary sampling (beach seine, trap/fyke net, pole seine, and purse seine) of different salmon species to compare performance, habitat utilization and life history types will be conducted on a monthly basis each year. Focused work on rearing capacity of restored versus reference wetlands linking salmonid usage, performance, and prey availability will occur annually from March through May in the lower Grays River, extending into the Columbia River estuary.
(See also BPA proposal -Section B, pages 1-6 and COE proposal pages 4-6).

2. Response to Federal recommendations/requirements. These proposals address key research recommendations derived from the Salmon at River's End (Bottom et al. 2005) analysis. The framework is consistent with the habitat-and-life-history-based vision of the Fish and Wildlife Program (NPPC 2000, amendment NPPC 2003). These projects also address priorities on the mainstem and estuary subbasin plan (p. A-5, LCFRB, 2004) and supplement (LCREP 2004). Phase II of the BPA proposal also incorporates an ecosystem approach based on understanding linkages between physical processes, salmon habitat opportunity and salmon life history expression, which is a need highlighted in the recent Retrospective Report by the Independent Scientific Review Panel (p. 92-95, ISRP 2005). All five objectives in the BPA proposal address primary management questions identified for "estuary uncertainties research" in BPA's Research, Monitoring, and Evaluation (RM&E) framework.

3-4. Broader significance and relationships to other regional projects. The activities described here are funded by two sources, but directly related in mission, purpose, sampling locations, sampling techniques, personnel, and processing and analyses of all fishes. The work is also directly linked to several other projects in the region. All of the projects are similar in sample processing and analyses, which allows direct comparisons and expansion of data compatibility. These projects include the ongoing BPA study of salmon ecology in the Columbia River plume titled "Columbia River basin juvenile salmonids: survival and growth in the Columbia River plume and northern California current" (Section 10 Permit #1410, ID #199801400), and the COE estuary monitoring project for collecting physical data via the CORIE monitoring network. The proposed work also addresses critical components not covered in a Columbia Land Trust (CLT) and Columbia River Estuary Taskforce (CREST) BPA project titled "Effectiveness Monitoring of Estuary Restoration Projects in the Grays River and Chinook River Watersheds" (ID #200300600). (see BPA proposal section D page 7-8). Columbia Land Trust and CREST will provide background fish abundances in the Grays River and Bay area, while our work will focus on habitat preference related to salmon size, monitor

movement amongst restored vs. natural habitats, and measure residence time and survival success in the Grays River/Bay area.

5. Justification for using listed species. We are not specifically targeting any listed stock of salmon in the study. However, because we are sampling in the lower Columbia River estuary and targeting coho, Chinook, and chum salmon in general, we will encounter listed salmon species in the course of this work. It is critical to use any salmonids we encounter to adequately analyze and describe the relationships between the fishes and the habitat they are occupying, especially when looking at rearing opportunities, food web linkages, and restored areas.

G. Project Methodology

1. Proposal Duration. The attached proposal was submitted for funding in fiscal year 2007-2009. However, the BPA and COE projects are expected to extend through fiscal year 2011, therefore this application is for a 5 year duration. Start date is January, 2007, ending December, 2011.

2. Procedures and Techniques. (see BPA proposal 200301000, Task 5b, page 29-30 and COE proposal task 1.2 page 11 and page 19)
Because of the variable habitat types (intertidal to subtidal), capture methods will include beach seines, trap/fyke nets, purse seines, and pole seines. We expect to conduct annually a total of 255 beach seines and 60 trapnets for the described work. Intrusive methods of processing will include anesthetizing, measuring, weighing, scanning for tags, finclipping, marking, tagging, gastric lavage, release, and euthanization. Intentional mortalities required by experimental design for the BPA and COE proposals combined are: 500 yearling Chinook salmon, 3,075 subyearling Chinook salmon, 450 coho salmon, and 435 chum salmon. See Table 1 for percentages of listed fish for each major taxanomic group. Generally fish will be processed on site. At a minimum, all potential listed species will be processed first, all salmon will be weighed, measured, and checked for tags and marks. For non-salmonids, all will be counted and a subset of 30 for each species will be measured.

a. Methods of capture – multiple seine methods (listed above) depending on the habitat and location in the estuary. Typically for small tidal channels such as intertidal zones of island and shoreline, trap/fyke nets and pole seines are used. In larger channels, found on island margins or estuarine shorelines, beach seines will be used. In areas of subtidal mudflats or where no suitable shoreline exists, such as throughout the lower Columbia River estuary bays (Grays, Baker, Cathlamet), purse seines will be the primary technique. See attached proposals for maps of study areas.
Methods of release – regardless of gear type, researchers utilize methods to minimize adverse effects on any fishes captured. All personnel are experienced in fish handling techniques to avoid lethal results of handling and stress. After fish are captured, they are held in live-wells with aerated and continually refreshed in situ water. Any fish that are anesthetized (primarily salmon, to reduce handling stress and

avoid injury while they are being processed) will be allowed to fully recover prior to release. Fish processing includes, measuring, weighing, and checking for marks or tags. Non-lethal tissue samples (finclip, scale) may be collected from up to 5,000 of the released salmon (run-of-river proportion of these will be listed fish). Fishes will be released in the area in which they were captured.

b. Tagging – In the Grays Bay/Grays River area tagging will occur in order to monitor controlled releases and allow sampling for habitat use and migratory timing and pathways. This can include the use of PIT tags, finclipping, and temperature marks on otoliths. Short-term acrylic paint tattoos, which typically last 0-3 months, will also be used. The groups of monitored fishes will be coordinated with the Washington Department of Fish and Wildlife that operates the Grays River Hatchery. Our research team will establish a series of releases of varying life history types of chum and Chinook salmon (based on size at release, and timing of releases), then will intensely follow the fishes as they migrate through the available natural/reference and restored habitats along the lower Grays River. This will allow comparisons to related sampling in the mainstem Columbia River as well as help describe salmon performance and benefit from restored versus natural habitats.

c. Drug Description - MS-222 will be used to anesthetize fishes, for both lethal and non-lethal purposes. Non-lethal dosages are determined by fish size and water temperature, usually not exceeding 1g/5 gal water. Any fish anesthetized will be allowed to fully recover prior to release.

d. Holding Time – Temporary holding time at capture site is determined by the size of catch; all salmon are given priority and processed first. Field personnel are experienced in processing proficiency and work to minimize the length of time fishes are anesthetized and overall holding times, generally under 30 minutes from capture to release. While it is not expected, there could be later potential that few salmon could be transported live to Point Adams Biological Field Station for processing. This is sometimes necessary to collect tissues in sterile conditions, and/or when its only possible to collect samples from recently deceased fishes (i.e., blood and bile samples). In those instances, fish would be held in a live-well with aerated water, sacrificed on site, and tissues immediately removed. Transportation time would be less than 2 hours and no long-term holding would occur.

e. **Number and Types of Samples** – see previous section E. 5 and G. 2 for details.

3. It is critical to use any salmonids we encounter to adequately analyze and describe the relationships between the fishes and the habitat they are occupying, especially when looking at rearing opportunities, food web linkages, and restored areas. To examine these relationships, we must access fish in their natural habitats. Listed fish must be included to apply the relationships of salmonids at large.

4. Potential injury or mortality. With all sampling there is an inherent risk of a fish being injured during capture or handling. Field personnel are trained in minimizing net related injuries unique to each gear type. Fish handling is minimized at every step in the process. Personnel are trained by people with +15 years experience in these sampling techniques and taught to identify the most common occasions when stress or injury could occur in order to best avoid these situations. There will be periodic review of sampling processes by all personnel and continual education and supervision for the duration of the project. To minimize the overall mortality count of targeted fish species, indirect mortalities will be used as part of the overall lethal take sample. Injured fishes will be humanely euthanized immediately upon discovery. We have been using all the sampling techniques successfully on related projects over the last 10 years and estimate incidental mortality to be 1% regardless of gear type.

H. Description and Estimates of Take

1. We propose to target river-run estuarine juvenile coho salmon (*Oncorhynchus kisutch*), spring and fall Chinook salmon (*O. tshawytscha*), and chum salmon (*O. keta*). The estimated impact of our proposed sampling on listed salmonid populations is detailed in Table 1. A complete review of the listing status of salmon in the Columbia River region can be retrieved from the National Marine Fisheries Services Northwest Region Protected Resource Division (http://www.nmfs.noaa.gov/regulationspermits.htm)

2. Sampling schedule. Columbia River mainstem sampling will begin in January 2007 and continue on a monthly basis through December 2011. The area includes the Columbia River from River Miles 0-102, using beach and purse seines and trap/fyke nets. To date there are eight mainstem sites and four marsh sites between West Sand Island (Rm 4) and Lord/Walker Island complex (Rm 60-64); however, expanding the sampling range to sites upriver as far as Rm 102 is expected. As sampling expands upriver, the overall number of sites is not expected to increase through time, just the range.

The Grays Bay (Rm 17-24) and Grays River focused studies related to habitat restoration, which includes beach and purse seine and trap/fyke net sampling, will be concentrated in the months of February-May of each study year. Specific timing within those months will be determined by hatchery release dates.

3. Recent status and trends of each species/population. Despite improvements in some of the listed stocks, NMFS still believes that stocks listed in the 1990's warrant protection. Listing status is provided by the Protected Resources Division, determination of how many of those listed species would be affected by our BPA and COE proposals was derived from an estimation memorandum from John W. Ferguson to James H. Lecky dated 13 June 2006 for estimating percentages of listed fish reaching various location on the Columbia River. Possible take in our sample locations could include:

Columbia River Chum Salmon ESU (Threatened)
Lower Columbia River Chinook Salmon ESU (Threatened)

Lower Columbia River Coho Salmon ESU (Threatened)
Lower Columbia River Steelhead ESU (Threatened)
Middle Columbia River Steelhead ESU (Threatened)
Snake River Basin Steelhead ESU (Threatened)
Snake River Fall-run Chinook Salmon ESU (Threatened)
Snake River Sockeye Salmon ESU (Endangered)
Snake River Spring/Summer-run Chinook Salmon ESU (Threatened)
Upper Columbia River Spring-run Chinook Salmon ESU (Endangered)
Upper Columbia River Steelhead ESU (Endangered)
Upper Willamette River Chinook Salmon ESU (Threatened)
Upper Willamette River Steelhead ESU (Threatened)

4. Table 1 – Estimated annual takes for listed Columbia River juvenile salmon using beach seine, purse seine, pole seine and/or trap/fyke nets. Collections will take place in the Columbia River Rm 0-102, 2007-2011. Requested numbers represent a cumulative impact of both studies described.

ESU/ species	Life stage	Origin	Take Activity	Number of Listed Fish Requested	Number of Requested Unintentional Mortality	Research Location	Research Period
Snake River (SnR) spring/summer Chinook salmon	juvenile	Wild	Intentional mortality	22	N/A	Columbia River Rm 0-102	January – December
SnR spring/summer Chinook salmon	juvenile	Hatchery ad- clip	Intentional mortality	6	N/A	Columbia River Rm 0-102	January – December
SnR spring/summer Chinook salmon	juvenile	Hatchery non-clip	Intentional mortality	1	N/A	Columbia River Rm 0-102	January – December
SnR yearling fall Chinook salmon	juvenile	Hatchery ad-clip	Intentional mortality	1	N/A	Columbia River Rm 0-102	January – December
SnR yearling fall Chinook salmon	juvenile	Hatchery non-clip	Intentional mortality	1	N/A	Columbia River Rm 0-102	January – December
Upper Columbia River (UCR) spring Chinook salmon	juvenile	Wild	Intentional mortality	4	N/A	Columbia River Rm 0-102	January – December
UCR spring Chinook salmon	juvenile	Hatchery ad-clip	Intentional mortality	1	N/A	Columbia River Rm 0-102	January – December
UCR spring Chinook salmon	juvenile	Hatchery non-clip	Intentional mortality	1	N/A	Columbia River Rm 0-102	January – December
Lower Columbia River (LCR) spring Chinook salmon	juvenile	Wild	Intentional mortality	20	N/A	Columbia River Rm	January – December
LCR spring Chinook salmon	juvenile	Hatchery ad-clip	Intentional mortality	7	N/A	Columbia River Rm 0-102	January – December
LCR spring Chinook salmon	juvenile	Hatchery nonclip	Intentional mortality	2	N/A	Columbia River Rm 0-102	January – December
Upper Willamette River (UWR) spring Chinook salmon	juvenile	Wild	Intentional mortality	86	N/A	Columbia River Rm 0-102	January – December
UWR spring Chinook salmon	juvenile	Hatchery adclip	Intentional mortality	16	N/A	Columbia River Rm 0-102	January – December
UWR spring Chinook salmon	juvenile	Hatchery nonclip	Intentional mortality	1	N/A	Columbia River Rm 0-102	January – December
Spring/summer Chinook salmon	juvenile	Not listed	Intentional mortality	234	N/A	Columbia River Rm 0-102	January – December
Snake River (SnR) subyearling fall Chinook salmon	juvenile	Wild	Intentional mortality	11	N/A	Columbia River Rm 0-102	January – December
SnR subyearling fall Chinook salmon	juvenile	Wild	Capture, handle, release	29	1/29	Columbia River Rm 0-102	January – December
SnR subyearling fall Chinook salmon	juvenile	Wild	Capture, handle, **tag**, release	10	0/10	Columbia River Rm 0-102	January – December
SnR subyearling fall Chinook salmon	juvenile	Hatchery ad-clip	Intentional mortality	41	N/A	Columbia River Rm 0-102	January – December

ESU/ species	Life stage	Origin	Take Activity	Number of Listed Fish Requested	Number of Requested Unintentional Mortality	Research Location	Research Period
SnR subyearling fall Chinook salmon	juvenile	Hatchery ad-clip	Capture, handle, release	103	1/103	Columbia River Rm 0-102	January – December
SnR subyearling fall Chinook salmon	juvenile	Hatchery ad-clip	Capture, handle, **tag**, release	34	1/34	Columbia River Rm 0-102	January – December
SnR subyearling fall Chinook salmon	juvenile	Hatchery non-clip	Intentional mortality	31	N/A	Columbia River Rm 0-102	January – December
SnR subyearling fall Chinook salmon	juvenile	Hatchery non-clip	Capture, handle, release	78	1/78	Columbia River Rm 0-102	January – December
SnR subyearling fall Chinook salmon	juvenile	Hatchery non-clip	Capture, handle, **tag**, release	26	1/26	Columbia River Rm 0-102	January – December
Lower Columbia Rier (LCR) tule fall Chinook salmon	juvenile	Wild	Intentional mortality	638	N/A	Columbia River Rm 0-102	January – December
LCR tule fall Chinook salmon	juvenile	Wild	Capture, handle, release	1,621	16/1,621	Columbia River Rm 0-102	January – December
LCR tule fall Chinook salmon	juvenile	Wild	Capture, handle, **tag**, release	540	5/540	Columbia River Rm 0-102	January – December
LCR tule fall Chinook salmon	juvenile	Hatchery ad-clip	Intentional mortality	774	N/A	Columbia River Rm 0-102	January – December
LCR tule fall Chinook salmon	juvenile	Hatchery ad-clip	Capture, handle, release	1,967	20/1967	Columbia River Rm 0-102	January – December
LCR LCR tule fall Chinook salmon	juvenile	Hatchery ad-clip	Capture, handle, **tag**, release	656	6/656	Columbia River Rm 0-102	January – December
LCR tule fall Chinook salmon	juvenile	Hatchery non-clip	Intentional mortality	562	N/A	Columbia River Rm 0-102	January – December
LCR tule fall Chinook salmon	juvenile	Hatchery non-clip	Capture, handle, release	1,427	14/1,427	Columbia River Rm 0-102	January – December
LCR tule fall Chinook salmon	juvenile	Hatchery non-clip	Capture, handle, **tag**, release	476	5/476	Columbia River Rm 0-102	January – December
LCR late fall Chinook salmon	juvenile	Wild	Intentional mortality	182	N/A	Columbia River Rm 0-102	January – December
LCR late fall Chinook salmon	juvenile	Wild	Capture, handle release	463	5/463	Columbia River Rm 0-102	January – December
LCR late fall Chinook salmon	juvenile	Wild	Capture, handle **tag**, release	154	2/154	Columbia River Rm 0-102	January – December
Fall Chinook salmon	juvenile	Not listed	Intentional mortality	835	N/A	Columbia River Rm 0-102	January – December
Fall Chinook salmon	juvenile	Not listed	Capture, handle, release	2,506	25/2506	Columbia River Rm 0-102	January – December
Fall Chinook salmon	juvenile	Not listed	Capture, handle, **tag**, release	835	8/835	Columbia River Rm 0-102	January – December
LCR coho salmon	juvenile	Wild	Intentional mortality	27	N/A	Columbia River Rm 0-102	January – December
LCR coho salmon	juvenile	Wild	Capture, handle, release	25	1/25	Columbia River Rm 0-102	January – December
LCR coho salmon	juvenile	Wild	Capture, handle, **tag**, release	8	0/8	Columbia River Rm 0-102	January – December
LCR coho salmon	juvenile	Hatchery Ad-clip	Intentional mortality	229	N/A	Columbia River Rm 0-102	January – December

ESU/ species	Life stage	Origin	Take Activity	Number of Listed Fish Requested	Number of Requested Unintentional Mortality	Research Location	Research Period
LCR coho salmon	juvenile	Hatchery ad-clip	Capture, handle, release	210	2/210	Columbia River Rm 0-102	January – December
LCR coho salmon	juvenile	Hatchery ad-clip	Capture, handle, **tag**, release	70	1/70	Columbia River Rm 0-102	January – December
LCR coho salmon	juvenile	Hatchery non-clip	Intentional mortality	34	N/A	Columbia River Rm 0-102	January – December
LCR coho salmon	juvenile	Hatchery non-clip	Capture, handle, release	31	1/31	Columbia River Rm 0-102	January – December
LCR coho salmon	juvenile	Hatchery non-clip	Capture, handle, **tag**, release	10	0/10	Columbia River Rm 0-102	January – December
Coho salmon	juvenile	Not listed	Intentional mortality	159	N/A	Columbia River Rm 0-102	January – December
Coho salmon	juvenile	Not listed	Capture, handle, release	146	1/146	Columbia River Rm 0-102	January – December
Coho salmon	juvenile	Not listed	Capture, handle, **tag**, release	49	1/49	Columbia River Rm 0-102	January – December
Chum salmon	juvenile	Wild*	Intentional mortality	435	N/A	Columbia River Rm 0-102	January – December
Chum salmon	juvenile	Wild*	Capture, handle, release	2,283	23/2,283	Columbia River Rm 0-102	January – December
Chum salmon	juvenile	Wild*	Capture, handle, **tag**, release	2,283	23/2,283	Columbia River Rm 0-102	January – December
SnR steelhead	juvenile	Wild	Capture, handle, release	38	1/38	Columbia River Rm 0-102	January – December
SnR steelhead	juvenile	Hatchery Ad-clip	Capture, handle, release	67	1/67	Columbia River Rm 0-102	January – December
SnR steelhead	juvenile	Hatchery Non-clip	Capture, handle, release	19	0/19	Columbia River Rm 0-102	January – December
UCR steelhead	juvenile	Wild	Capture, handle, release	1	0	Columbia River Rm 0-102	January – December
UCR steelhead	juvenile	Hatchery Ad-clip	Capture, handle, release	9	0	Columbia River Rm 0-102	January – December
UCR steelhead	juvenile	Hatchery Non-clip	Capture, handle, release	4	0	Columbia River Rm 0-102	January – December
Mid-Columbia River (MCR) summer steelhead	juvenile	Wild	Capture, handle, release	28	1/28	Columbia River Rm 0-102	January – December
MCR summer steelhead	juvenile	Hatchery Ad-clip	Capture, handle, release	8	0	Columbia River Rm 0-102	January – December
MCR summer steelhead	juvenile	Hatchery Non-clip	Capture, handle, release	1	0	Columbia River Rm 0-102	January – December
MCR winter steelhead	juvenile	Wild	Capture, handle, release	1	0	Columbia River Rm 0-102	January – December
MCR winter steelhead	juvenile	Hatchery Ad-clip	Capture, handle, release	1	0	Columbia River Rm 0-102	January – December

ESU/ species	Life stage	Origin	Take Activity	Number of Listed Fish Requested	Number of Requested Unintentional Mortality	Research Location	Research Period
LCR summer steelhead	juvenile	Wild	Capture, handle, release	2	0	Columbia River Rm 0-102	January – December
LCR summer steelhead	juvenile	Hatchery Ad-clip	Capture, handle, release	7	0	Columbia River Rm 0-102	January – December
LCR winter steelhead	juvenile	Wild	Capture, handle, release	18	0/18	Columbia River Rm 0-102	January – December
LCR winter steelhead	juvenile	Hatchery Ad-clip	Capture, handle, release	18	0/18	Columbia River Rm 0-102	January – December
UWR winter steelhead	juvenile	Wild	Capture, handle, release	8	0	Columbia River Rm 0-102	January – December
Sockeye	juvenile	Wild**	Capture, handle, release	100	2/100	Columbia River Rm 0-102	January – December

* The request for chum salmon includes both hatchery and wild populations as they cannot be differentiated in the field or using the analyses we are conducting for this study. The conservative approach is to assume that all chum salmon we catch are part of listed wild populations.

** The request for sockeye salmon includes both hatchery and wild populations as there are no estimates available to calculate the differentiated impact. As such, all sockeye salmon captured are assumed to be wild.

5. Justification for potential mortalities. See sections F.5 and G.3 for explanation of potential take of listed fishes. Derivation of numbers provided in section H.6 below. Salmon found in the study area need to be sacrificed and examined to determine benefits derived from the habitat in which they are found. This is achieved through measuring parameters such as prey consumption, body condition, parasite and disease levels, and growth. From these determinations we will be better able define and guide restoration priorities and help determine salmon response to future changes in habitat.

6. Details on take estimates.

Catch/effort and total numbers of each major listed fish category (yearling Chinook salmon, subyearling Chinook salmon, coho, chum, steelhead, and sockeye salmon) were determined by combining sources of information relating to known catch rates from previous sampling experience during the last 5 years of related studies by these researchers in the lower Columbia River estuary, Grays Bay, and the Columbia River mainstem. From this information the estimated catch per seine or trapnet was calculated and then multiplied by the expected number of seines or trapnets that would be conducted. Estimated total catch numbers, all gear types combined, for each major category were 500 yearling Chinook salmon, 14,000 subyearling Chinook salmon, 1,000 coho salmon, 5,000 chum salmon, 500 steelhead, and 100 sockeye salmon. To estimate the total number of listed fishes captured, survival estimates from the memorandum titled "Revised estimation of percentages for listed Pacific Salmon and Steelhead smolts arriving at various locations in the Columbia River basin in 2005 based on June 2005 changes in listing status" from John W. Ferguson to James H. Lecky, dated June 13, 2006 were applied to the total expected catch of each major listed fish category. The survival to Tongue Point, full transportation scenario was used (tables 7a, 7c and 9) for all estimates.

A total of 255 beach seines and 60 trapnets are expected to be conducted annually for the described work.
Subyearling Chinook salmon – To address the goals of this work with adequate power of analysis, 3,075 subyearling Chinook salmon are to be lethally taken in each year. This is 22.8% of the estimated total catch based on past sampling; this percentage was applied to the expected catches of each listed subyearling Chinook salmon category to determine the actual numbers of listed fish that will be sacrificed.
Yearling Chinook salmon – Based on historical sampling, we typically catch <1 yearling Chinook salmon per seine or trapnet effort. To address the goals of this work with adequate power of analysis, 500 yearling Chinook salmon are to be lethally taken in each year. Due to the relative ineffectiveness of our gear in catching yearling Chinook salmon, it is highly unlikely that we will ever reach this number of yearling Chinook salmon. Therefore the lethal take multiplier is 100%.
Coho salmon – The study design calls for 450 coho salmon to be selected annually for lethal take. This is 45% of the estimated total catch, which was applied to the expected catches of each listed coho salmon category to determine the number of listed fish that will be sacrificed.

Chum salmon – A total of 435 chum salmon are to be selected annually for lethal take. This is 8.7% of the total catch. There are no listed chum salmon survival estimates to Tongue Point available, so the requested impact covers our total catch.
Steelhead and sockeye salmon – These are not targeted species in this study, so take includes only estimates for capture, handle, and release and incidental mortalities in the course of acquiring necessary sample fish.

Other listed species – We do not anticipate capturing any species that are listed by other agencies (such as the United States Fish and Wildlife Service).

I. Transportation and Holding

1. Transportation of a listed species. We do not expect to transport any live fish. In the event that this becomes necessary, it is likely the fish will be transported to NMFS Point Adams Biological Field Station for immediate sacrifice and necropsy. On no more than a quarterly basis this could include a subset of the daily catch, and likely total less than 30 individuals of the targeted species (yearling/subyearling Chinook, coho, chum salmon). Distance traveled from the collection site to Point Adams Biological Field Station would be 100 miles or less. Fish will be transported in large coolers with aerated water. Maximum transport time would be approximately 2 hours.

2. Holding of listed species. We do not anticipate the need to hold any fishes for extended periods of time.

J. Cooperative Breeding Program

We are willing to participate in a cooperative breeding program if such an action is requested.

K. Previous or Concurrent Activities Involving Listed Species

1. Previous or current ESA permits. Several of the researchers listed in this permit application have been involved with the following ESA permits -
Permit # 1322 Mod 4, 2001-2006.
Permit # 1290 Mod. 2, 2001-2006.
Permit # 1410 Mod 3, 1998-2007.

For the permits listed above, the work occurred in some portion of the lower Columbia River or nearshore environments, thus impacting federally listed species.

2. Mortality events of listed species. There have been no unusual or unexpected mortalities resulting from sampling activities for the ESA permits above. We use experienced people to oversee all operations to help minimize all mortalities. We

continually strive to improve and select gear types that do not adversely impact any fishes so that they can be released unharmed. We collaborate with as many other researchers as possible to maximize the use of every fish that is sacrificed. By involving other research programs in the lower Columbia River (i.e. Columbia Land Trust and CREST Gray River sampling) we can coordinate sampling and look for ways to share selected mortalities in an attempt to lower the region's overall numbers of lethally taken listed fish.

L. Certification

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand this information is submitted for the purpose of obtaining a permit under the Endangered Species Act of 1973 (ESA) and regulations promulgated thereunder, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or to penalties under the ESA."

John W. Ferguson 6/29/06

Signature Date

John W. Ferguson
NMFS, Director, Fish Ecology Division

M. Length of time and cost to prepare application

1. **Time.** For all contributing personnel, 96 hours
2. **Costs.** $100 (Excluding labor)

N. References

Bottom, D. L., C. A. Simenstad, A. M. Baptista, D. A. Jay, J. Burke, K. K. Jones, E. Casillas, and M. H. Schiewe. 2005. Salmon at river's end: The role of the estuary in the decline and recovery of Columbia River salmon. NOAA Technical Memorandum NMFS-NWFSC-68, 246pp.

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Lower Columbia River Estuary Partnership (LCREP), 2004. http://www.lcrep.org/pdfs/10%20Estuary%20Partnership%20Subbasin%20Supplement.pdf

Lower Columbia River Fish Recovery Board (LCRFRB). 2004. Lower Columbia salmon recovery and fish and wildlife subbasin plan. Vol. II, Chap. C – Grays. Grays-Elochoman and Cowlitz Rivers (WRIAS 25-26) Watershed Management Plan, Chapter 7 Appendix – Management of Fish Habitat Conditions.

Northwest Power Planning Council. 2000. http://www.nwcouncil.org/library/2000/2000-19/Default.htm

Northwest Planning Power Council. 2003. http://www.nwcouncil.org/library/2003/2003-11.htm